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THE PLANT DISEASE REPORTER

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THE PLANT DISEASE SURVEY

Division of Mycology and Disease Survey
BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING
AGRICULTURAL RESEARCH ADMINISTRATION
UNITED STATES DEPARTMENT OF AGRICULTURE

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May 15, 1949

The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

THE PLANT DISEASE REPORTER

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THE PLANT DISEASE SURVEY
DIVISION OF MYCOLOGY AND DISEASE SURVEY

Plant Industry Station — Beltsville, Maryland
Volume 33 — May 15, 1949 — Number 5

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THE INFLUENCE OF WEEKLY CUMULATIVE RAINFALL AND TEMPERATURE ON POTATO LATE BLIGHT EPIPHYTOTICS IN IOWA[1]

Jack R. Wallin and Paul E. Waggoner[2]

Two methods of predicting the increase and spread of Phytophthora infestans have been proposed in the United States. In one method the monthly mean rainfall and temperature data were used, while in the other, weekly means were employed. These methods by necessity dealt with weather data taken from stations oftentimes remote from potato producing centers. Although limited, these data were and are the best available. As a result, only the meteorological factors of temperature and rainfall have been utilized in forecasting late blight epiphytotics.

In 1942 and 1945. Melhus (5,6) reported his blight forecasting results based on monthly mean temperatures and rainfall. He was remarkably successful in predicting general areas of heavy infection in the Upper Mississippi Valley States. He suggested three conditions that promote late blight outbreaks. First, inoculum must be present; second, the temperature and moisture conditions must favor the growth of the organism; and third, there must be an abundance of rapidly growing susceptible foliage. In 1947 and 1948, Cook (1,2) was successful in forecasting tomato late blight in Virginia. His forecasts were based on cumulative weekly rainfall and temperature averages for the months of May, June, and July. If the temperature remained under 75°F. for a sufficiently long time in May and early June, and if the weekly rainfall increment was consistently greater than a critical cumulative rainfall line, then conditions were considered to be favorable for blight development and forecasts were issued accordingly. The critical rainfall line was a line established halfway between the means of two severe blight years and fifteen non-blight years.

The Occurrence of Potato Late Blight in Iowa From 1915 to 1948

Cook's reported success with cumulative rainfall in blight forecasting in Virginia led to an examination of the possibilities of utilizing a critical rainfall line for predicting the development of potato late blight in Iowa. Iowa afforded a suitable location for testing the

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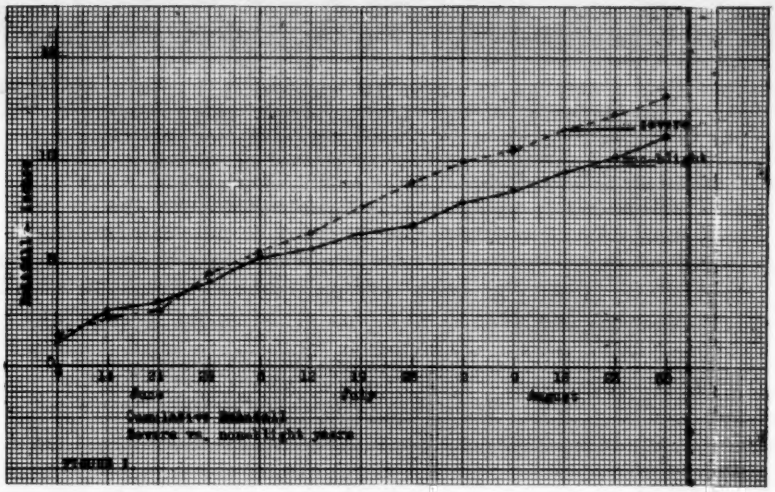
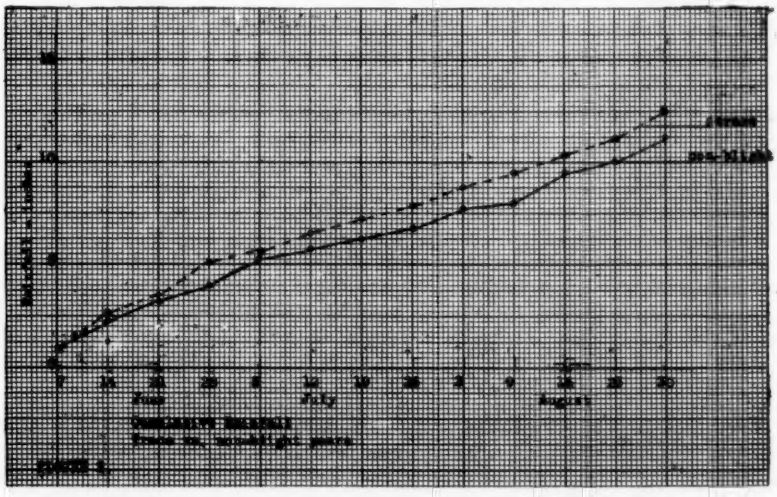
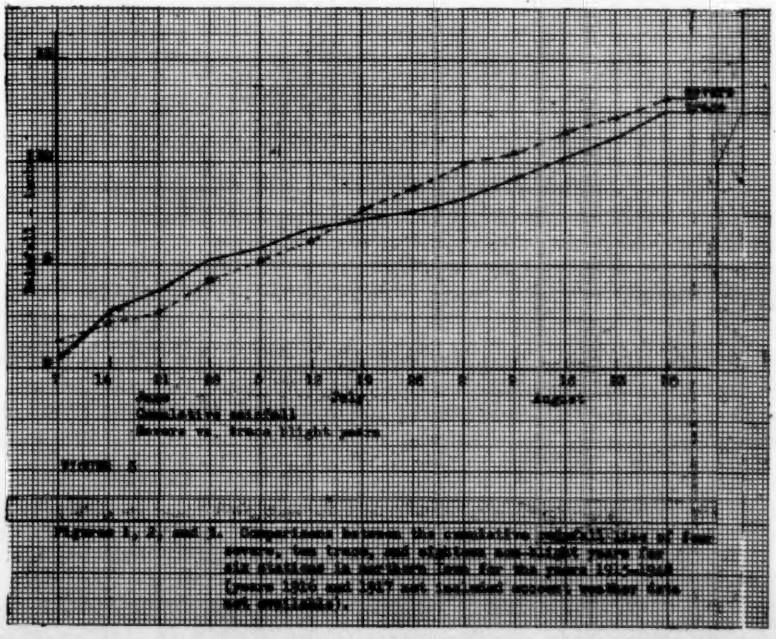
1 Report of a study made under the Research and Marketing Act of 1946. Cooperative investigations between the Iowa Agricultural Experiment Station and the Division of Mycology and Disease Survey, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture.

2 Pathologist and Agent, Division of Mycology and Disease Survey, U. S. Department of Agriculture.

3 The years 1916 and 1917 were omitted because the weather data were unavailable.







Figures 1, 2, and 3. Comparisons between the cumulative precipitation (sum of rain, snow, and hail) and cumulative number of days with precipitation in Cincinnati, Ohio, for the years 1964 (green line) and 1967 (red line) (1964 data incomplete; 1967 data not available).

method because plant disease survey records of the Iowa Agricultural Experiment Station showed that during the past 32 years severe blight occurred in 1915, 1918, 1942, and 1943; a trace of blight in 1925, 1928, 1939, 1942, 1944, 1945, 1946, 1947, and 1948; and no blight in eighteen years. Unfortunately however, the date of first occurrence was not recorded for the severe blight years of 1915 and 1918, and the trace blight years 1924, 1925, 1928. This left much to be desired because date of first occurrence for some of the trace blight years would suggest the predisposing weather conditions for blight development.

Rainfall and Temperature Data From Six Stations in Northern Iowa

Rainfall and temperature data from six stations in northern Iowa for the years 1915 to 1948 were compiled from the U. S. Weather Bureau Climatological Data. The six stations were chosen as most representative of the commercial potato producing region of north central Iowa. The weekly rainfall and temperatures were averaged for the six stations for the period June 1 to August 30. June 1 was selected as the starting date because late blight has not been reported in Iowa earlier than June 29. Furthermore, with favorable weather by June 1, potato plants are usually six to twelve inches high with enough foliage to allow some development and spread of the late blight pathogen. There is a four week period between June 1 and June 29, the earliest date of reported blight occurrence in Iowa. In calculating the rainfall data in Virginia, Cook (1) allowed a similar period before first reported late blight occurrence.

In accordance with Cook's method, the weekly mean cumulative rainfall in inches and the weekly mean temperature were determined for the four severe blight years, the ten trace blight years and the eighteen non-blight years. The mean cumulative weekly rainfall for the severe and non-blight years were plotted in Figure 1. A similar comparison for the trace and non-blight years was made in Figure 2, and for the trace and severe blight years in Figure 3.

Comparisons Between The Cumulative Rainfall Lines of The Severe, Trace and Non-blight Years

Figures 1, 2, and 3 indicated that there was little difference in the slopes of the cumulative rainfall lines for the severe, trace and non-blight groups of years. The severe and non-blight lines overlap one another for the first five weeks after June 1. After the fifth week the lines diverge and by August 30, they differed by 1.6 inches. The trace and non-blight lines were divergent for a longer period, but 1.5 inches was the greatest difference between them. The severe and

trace blight lines overlapped the most. For five weeks rainfall was greater in the trace than in the severe blight years. However, during the last six weeks the severe blight years had slightly more cumulative rainfall than the trace blight years. By August 30, there was only 1.0 inch difference between the two lines.

Although there were only small differences between the lines for the three groups of years, a critical rainfall line was struck midway between the severe and non-blight lines. Individual years of the three blight groups were plotted against the line as shown in Figures 4, 5, and 6.

Obviously the individual year lines overlap the critical line. The four severe blight lines shown in Figure 4 tend to follow the critical line and yet three of the lines went above and below. In Figure 5, the lines for some of the trace blight years went above the critical line while others went below. The same was true of the non-blight year lines in Figure 6. Therefore, the data indicated that the weekly cumulative rainfall for the trace and non-blight years was not consistently below the critical line.

The relatively small differences between the severe, trace and non-blight cumulative rainfall lines suggested that there might be considerable variability of weekly rainfall values for the individual years. In Figure 7, the frequency distribution of the weekly values were plotted for the individual years. The wide distribution of points on the diagram was striking and indicated the variability in cumulative rainfall within year groups.

Straight lines were fitted to the cumulative rainfall data for the individual years by the method of the least squares.[4] The calculated slopes of the yearly cumulative rainfall lines were grouped as above on the basis of blight severity and are presented in Table 1. An analysis of variance for the slopes of the three blight year groups is shown in Table 2. This analysis indicated no evidence of difference between the means of slopes for the three classes of blight years. Therefore, any further analysis and interpretation of cumulative rainfall data for Iowa seemed unjustifiable.

Nevertheless, a critical line was determined by taking the average between the cumulative rainfall slope means for the severe and trace blight years. An average between these two groups was 1.00 which was higher than an average between the severe and non-blight years. A higher critical line should tend to eliminate more of the trace and

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[4] The authors wish to acknowledge the assistance of Professor G. W. Snedecor in advising statistical procedures.

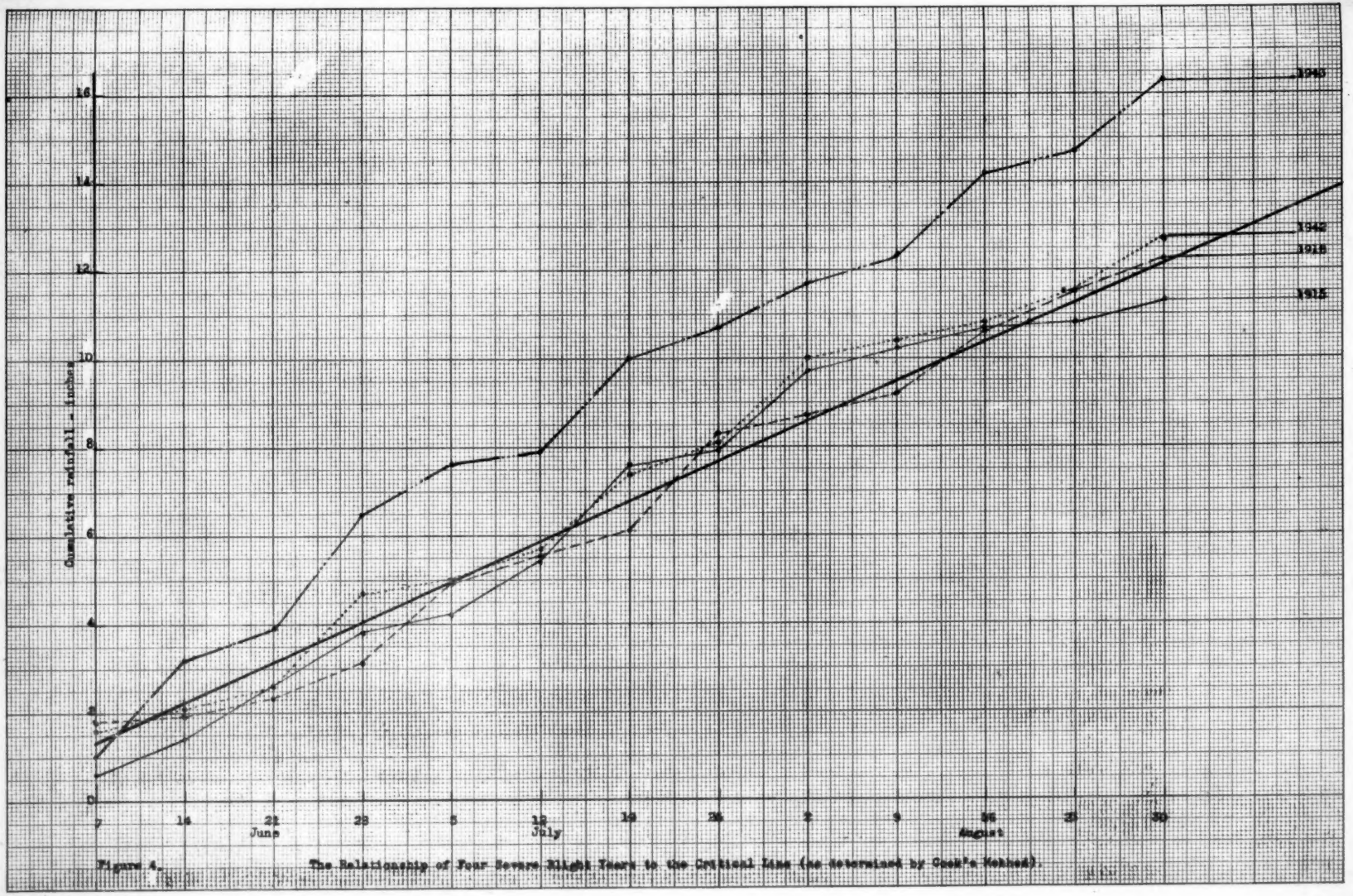


Figure 4. The Relationship of Four Severe Blight Years to the Critical Line (as determined by Cook's Method).

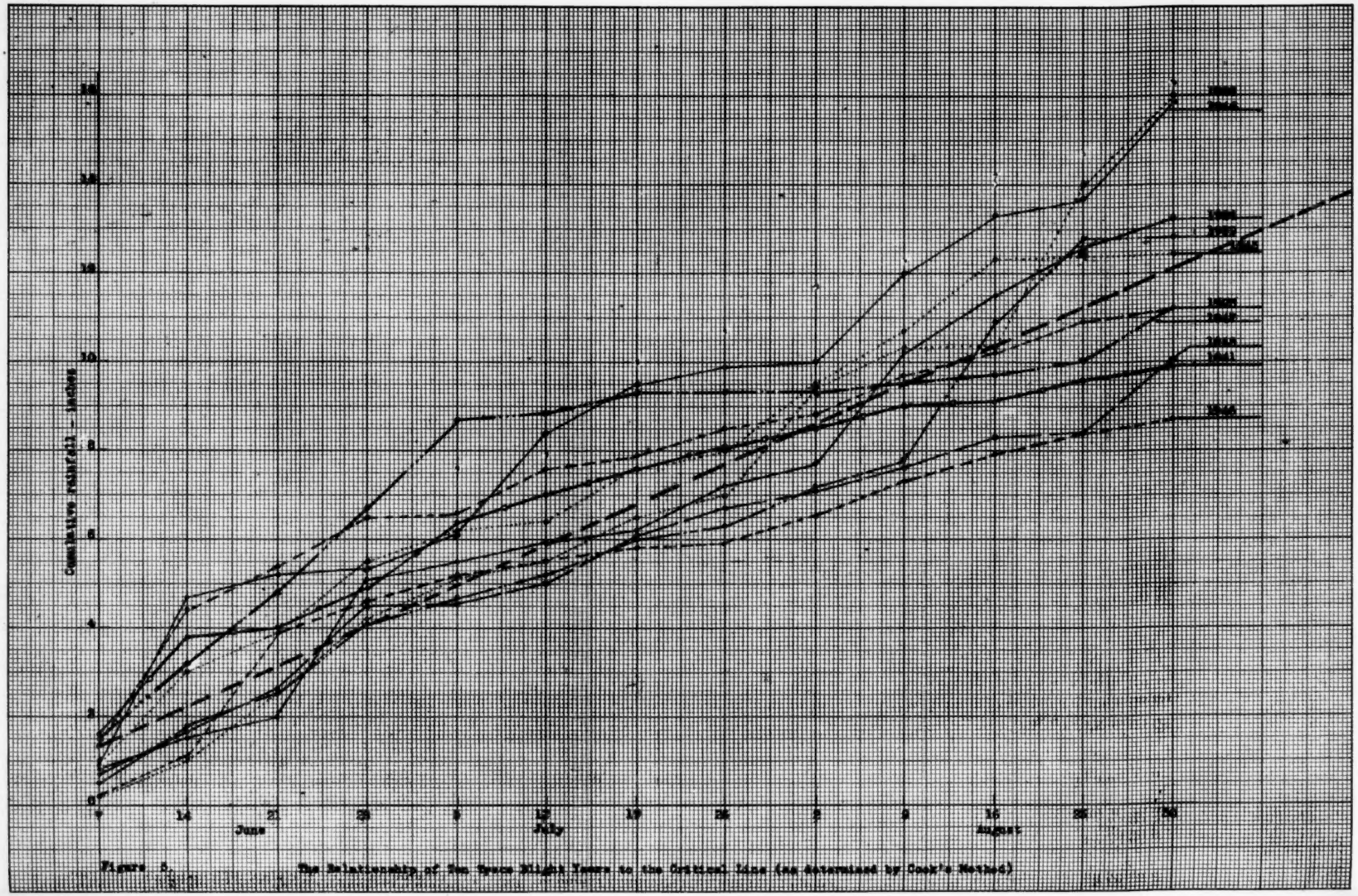


Figure 5. The Relationship of Ten Seven Night Years to the Critical Idso (as determined by Cook's Method)

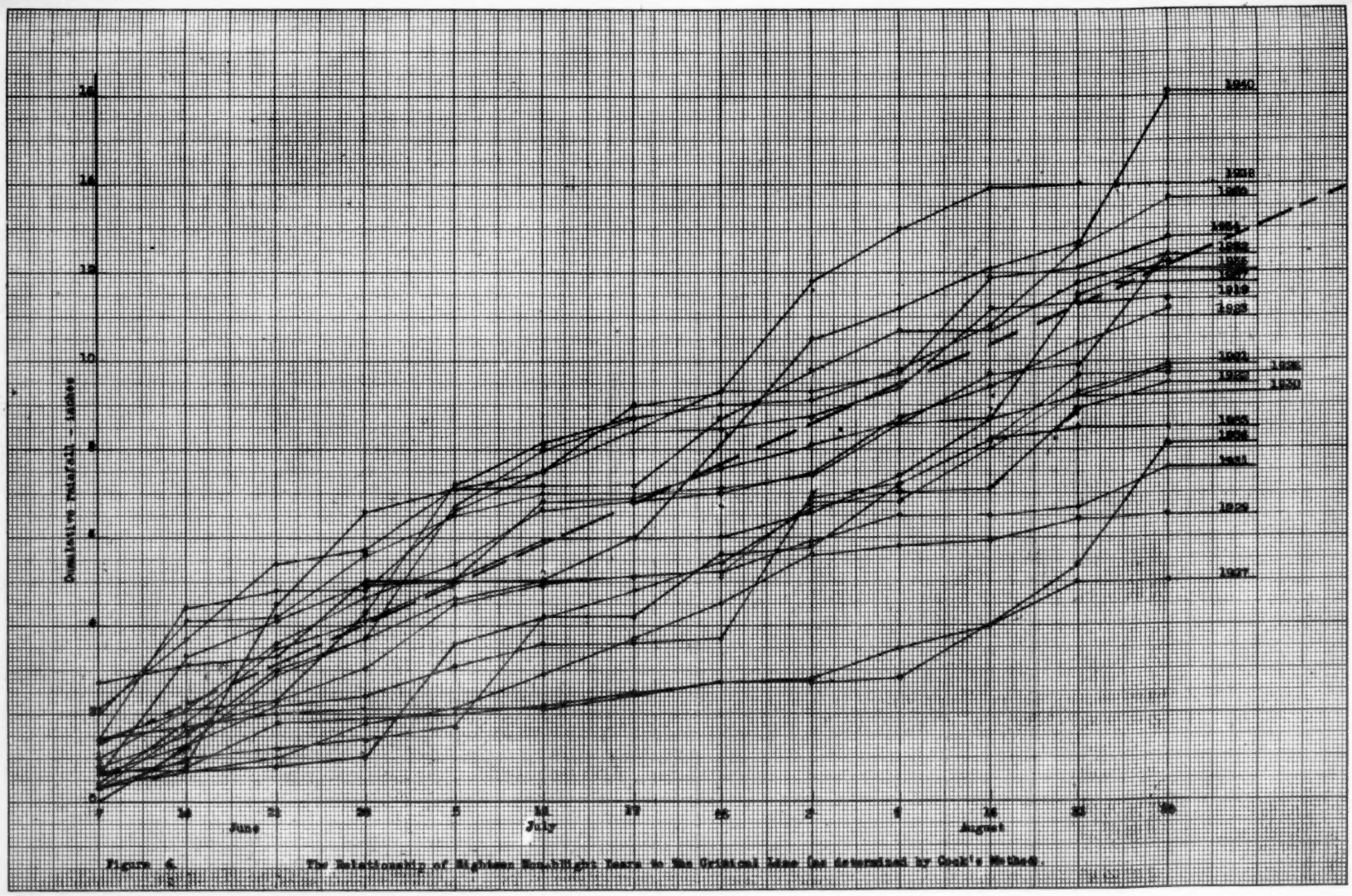


Figure 6. The Relationship of Eighteen Month Night Years to The Original Year (as determined by Cook's Method).

SEVERE BLIGHT YEARS
TRACE BLIGHT YEARS
NON-BLIGHT YEARS
JUNE
JULY
AUGUST

Table 1. Slopes of 32 Least Squares Lines Through Cumulative Rainfall Points for the Thirteen Week Period Beginning June 1 at Six Northern Iowa Weather Stations.

Blight Development					
Yr.	Severe	Yr.	Trace	Yr.	No Blight
1915	.949	1924	.993	1919	1.016
1918	.946	1925	.999	1920	1.062
1942	1.004	1928	1.054	1921	.745
1943	1.298	1939	.925	1922	.684
		1941	.907	1923	.894
		1944	1.220	1926	.704
		1945	1.054	1927	.373
		1946	.746	1929	.527
		1947	1.018	1930	.867
		1948	.780	1931	.628
				1932	.916
				1933	.673
				1934	1.076
				1935	1.031
				1936	.423
				1937	.867
				1938	1.199
				1940	2.032
Sx	4.197		9.696		15.717
K	4		10		18
$\bar{x}$	1.049		0.970		0.873

Table 2. Analysis of Variance of Slopes of Three Classes of Blight Years.

Source variation	D/F	SS	MS
Between groups	2	0.130	0.065
Within groups	29	2.584	0.0926

$F = .065/.092 = 0.70$

non-blight years than an average between the severe and non-blight year groups. Comparisons of the critical slope with the calculated slopes shown in Table 1 indicated that only 50 percent of the severe and 40 percent of the trace blight years had greater slopes than the critical line. Moreover, 6 of the non-blight years had greater slopes than the critical line.

If an average between the severe and non-blight means, 0.96, had been used, 50 percent of the severe and 60 percent of the trace years would have had greater slopes than this value. As before, 33 percent of the non-blight years would have had greater slopes than the critical line.

The relationship of the individual years to the critical line, 1.0, was examined as shown in Figures 8, 9 and 10. There was great variability among years in the three blight groups.

Weekly Mean Temperature and Blight Years

The mean temperature of the blight year groups shown in Figures 11, 12 and 13 were all below the critical temperature of 75°F. The non-blight years tended to be warmer by two or three degrees in some weeks. A comparison of the temperature lines for the trace and severe years indicated that the trace years tended to be cooler. However, before the relationship of weekly mean temperatures to severe, trace or non-blight years can be explained, the temperature data of individual years must be examined.

The Relationship of Weekly Periods of Rainfall and Temperature To Blight Years

Table 3 was compiled to study the relationship of weekly periods of favorable cumulative rainfall and temperature to blight years. The weekly mean temperatures of 75°F. or under and cumulative rainfall means above the critical line, 1.0, were considered favorable for blight development. The periods of favorable temperature and rainfall were designated by the letters TR.

The data in Table 3 indicated that only temperature was favorable for the first five weeks of 1915, a severe blight year. In 1918, another severe blight year, temperature and rainfall were favorable for blight in the first week and temperature only was favorable during the next five weeks. In the blight year of 1942, both temperature and rainfall were generally favorable although there were more weeks of favorable temperature than rainfall. In 1943, a blight year less severe than 1942, both rainfall and temperature

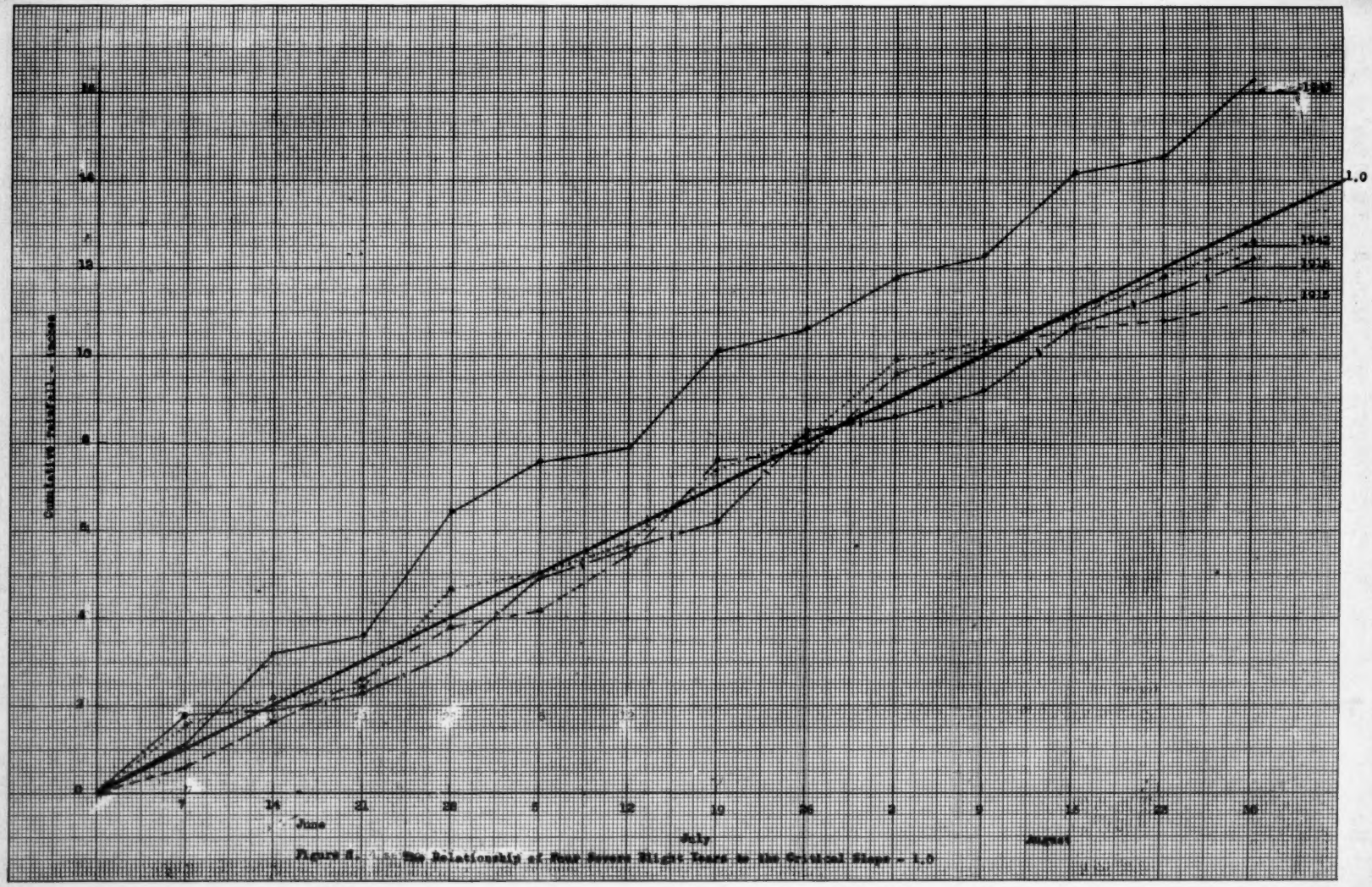


Figure 8. The Relationship of Most Severe Night Years to the Critical Stage - 1.0

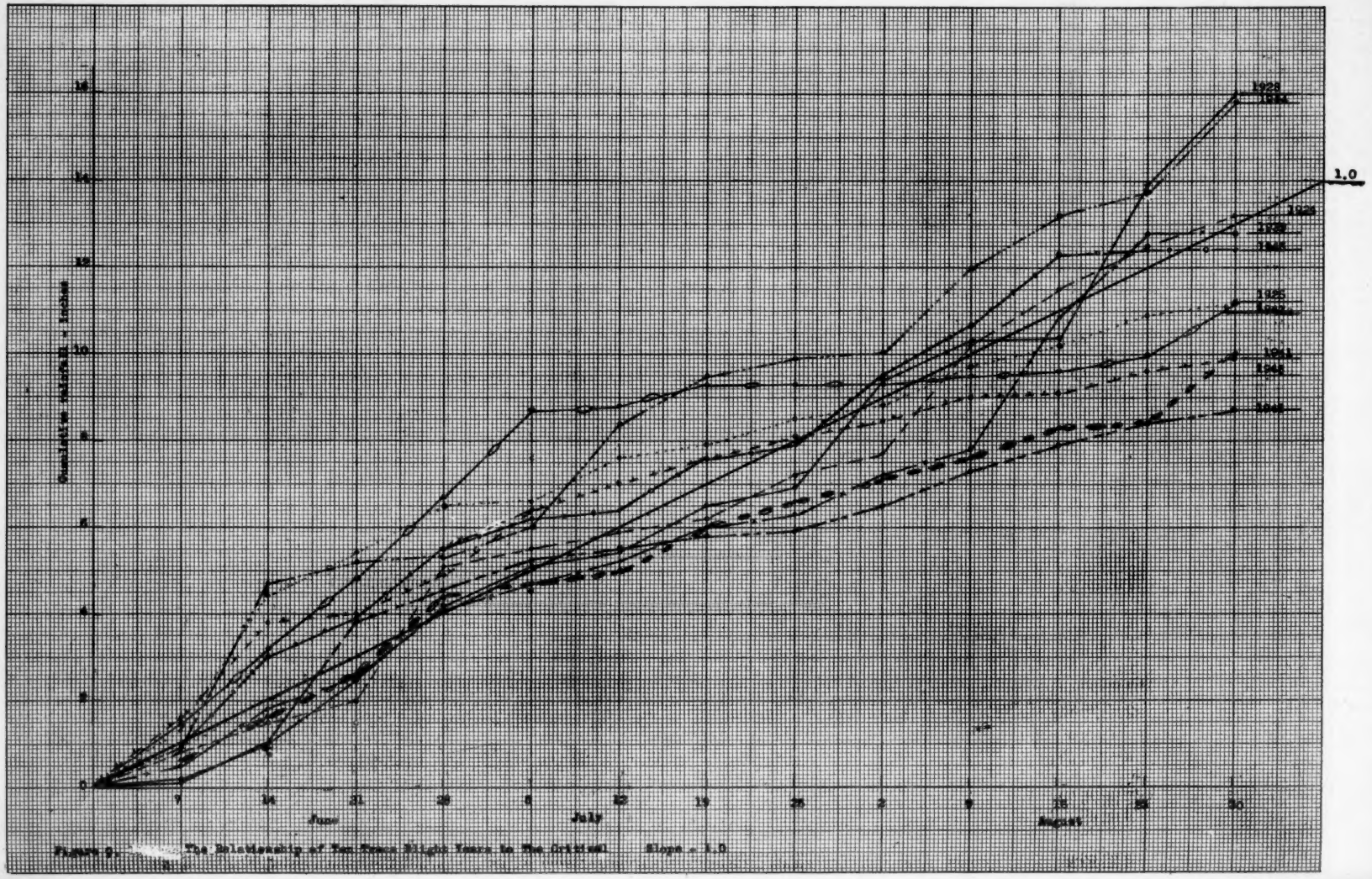


Figure 9. The Relationship of Ten Years Slight Years to the Critical Slope = 1.0

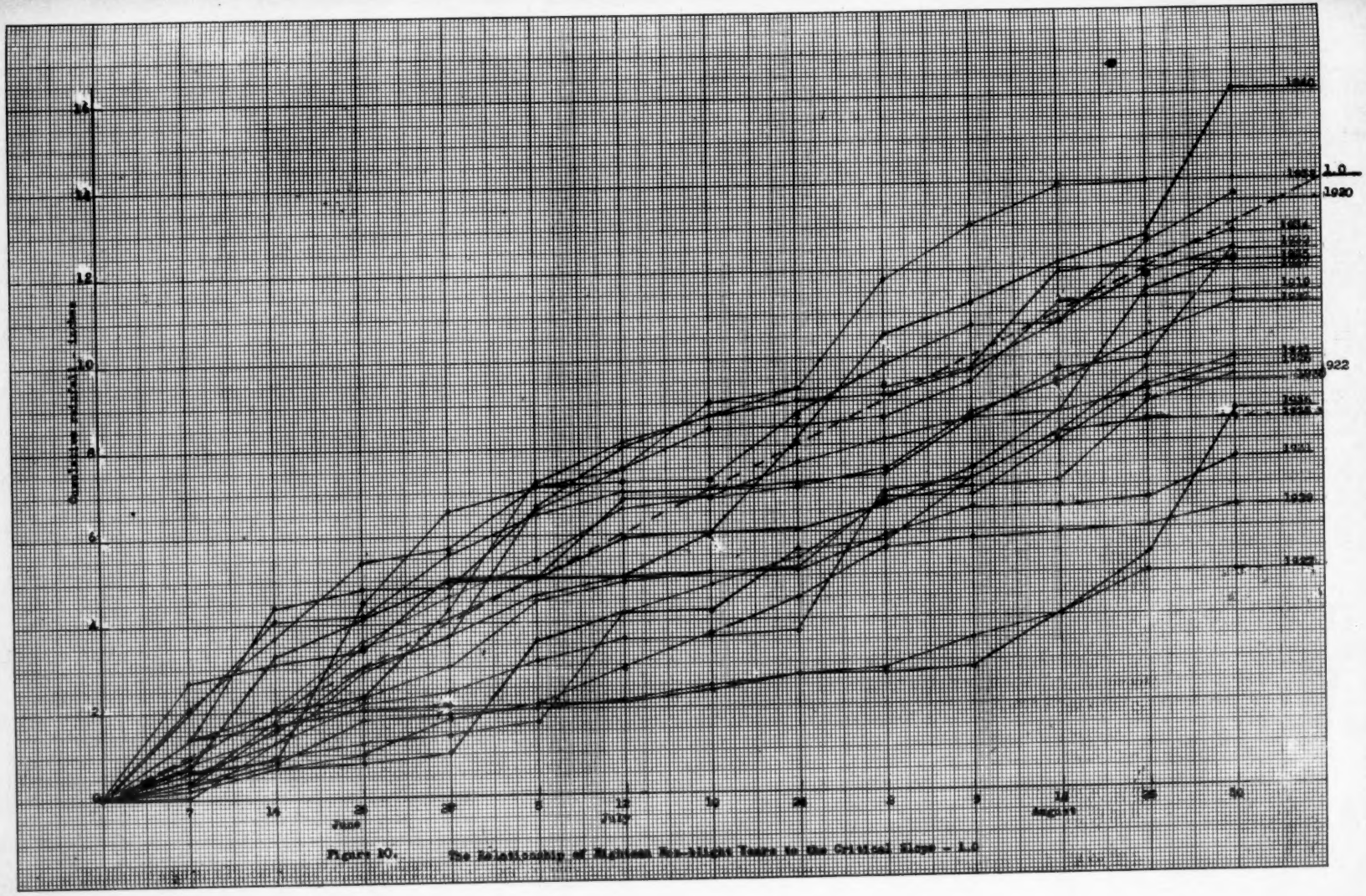
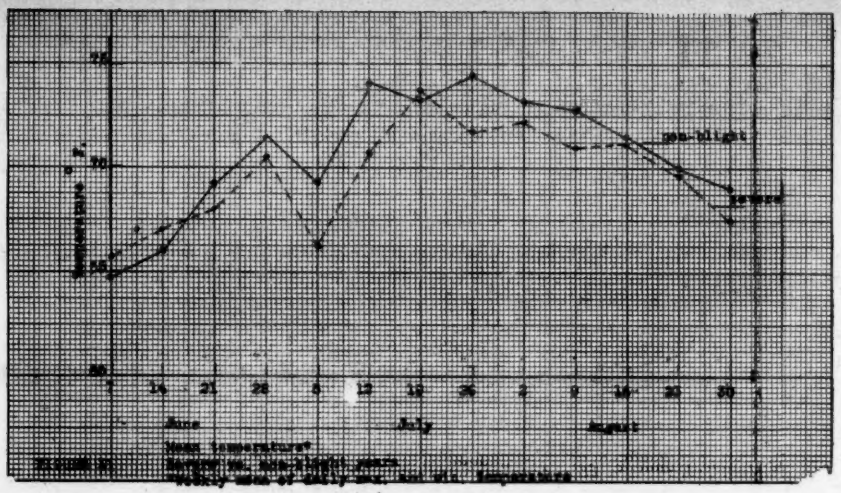
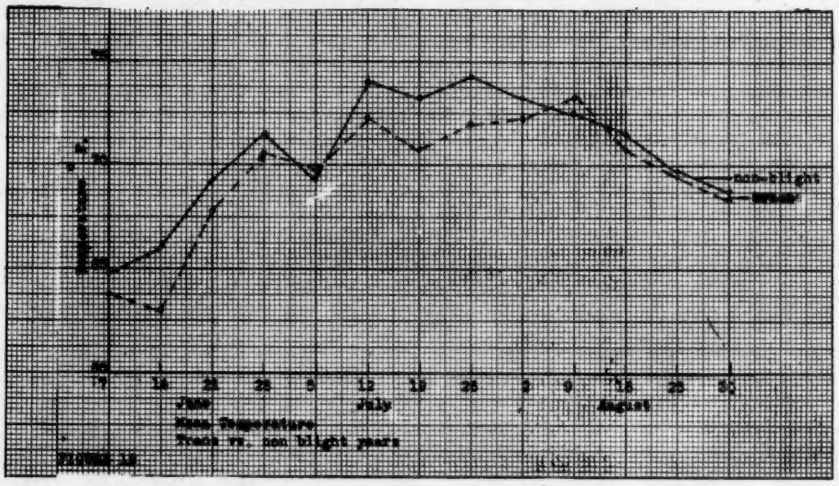


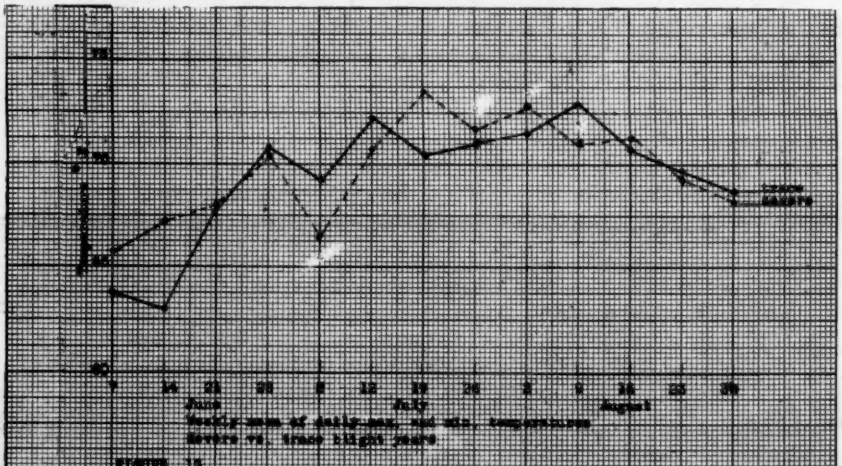
Figure 10. The Relationship of Maximum Sunshine Years to the Critical Slope - 1.0



Mean temperature
Blight vs. non-blight years
Weekly sums of daily max. and min. temperatures



Mean Temperature
Trace vs. non blight years



Weekly sums of daily max. and min. temperatures
Severe vs. trace blight years

Figures 11, 12, and 13. Comparisons between the weekly sums of daily maximum and minimum temperatures of the four severe, two trace, and eight non-blight years for the six stations in Southern Utah for the years 1913-1948 (years 1916 and 1919 not included because weather data not available).

Table 3. The relationship of late blight years to temperature and rainfall 1915 - 1948.

Year	Degree of Blight	June				July				August				
		7	14	21	28	5	12	19	26	2	9	16	23	30
1915	S	T	T	T	T	T	T	TR	T	TR	TR	T	T	T
1918	S	TR	T	T	T	T	T	:	TR	:	T	T	T	:
1919	0	TR	TR	TR	R	R	R	R	R	T	TR	T	T	T
1920	0	TR	R	TR	:	R	R	R	R	T	TR	T	:	:
1921	0	T	:	T	:	:	:	T	T	TR	T	T	TR	:
1922	0	T	T	T	T	T	T	T	T	T	T	T	T	T
1923	0	T	TR	TR	TR	TR	R	T	:	T	T	T	T	T
1924	tr	T	T	T	TR	TR	T	T	T	T	TR	TR	TR	TR
1925	tr	R	TR	TR	TR	TR	R	TR	TR	T	T	T	T	T
1926	0	T	T	T	T	T	T	T	T	T	T	T	T	T
1927	0	T	T	T	T	T	T	T	T	T	T	T	T	T
1928	tr	T	T	T	TR	TR	T	T	T	TR	TR	T	TR	TR
1929	0	T	T	T	T	T	T	:	T	T	T	T	T	T
1930	0	TR	TR	TR	TR	TR	R	TR	:	:	T	T	T	:
1931	0	T	T	TR	:	T	:	T	:	:	T	T	T	:
1932	0	T	T	TR	TR	TR	TR	:	:	T	T	T	T	T
1933	0	:	T	:	T	:	:	T	T	T	T	T	T	T
1934	0	R	TR	TR	R	R	TR	R	R	TR	:	TR	TR	TR
1935	0	T	T	TR	TR	R	TR	TR	R	R	R	T	T	T
1936	0	TR	T	T	T	:	:	:	T	T	:	:	:	T
1937	0	T	TR	TR	TR	T	:	:	:	:	:	T	:	:
1938	0	TR	TR	T	TR	R	R	TR	TR	TR	R	TR	TR	TR
1939	tr	T	T	T	TR	T	:	T	T	T	T	T	TR	T
1940	0	TR	TR	TR	TR	TR	T	T	R	R	TR	TR	TR	TR
1941	tr	TR	TR	TR	R	TR	TR	TR	TR	R	:	T	T	T
1942	S	TR	TR	T	TR	TR	T	R	TR	TR	TR	T	T	T
1943	S	TR	TR	TR	R	TR	TR	TR	TR	R	TR	R	R	R
1944	tr	T	TR	TR	R	TR	TR	TR	TR	TR	TR	R	TR	TR
1945	tr	TR	TR	TR	TR	TR	TR	TR	R	TR	TR	TR	TR	T
1946	tr	T	T	TR	TR	TR	:	T	T	T	T	T	T	T
1947	tr	TR	TR	TR	TR	TR	TR	TR	R	:	:	:	:	T
1948	tr	T	T	T	TR	T	:	T	T	T	T	T	T	:

T - Temperature favorable TR - Temperature and rainfall favorable

R - Rainfall favorable : - Neither favorable

S - Severe 0 - None tr - Trace

were generally favorable for blight. During this year there were 13 weeks of favorable rainfall and 8 weeks of favorable temperature. Rainfall and temperature during the trace blight years 1925, 1941, 1944 and 1945 were equally as favorable as for the severe blight years of 1942 and 1943. In addition conditions during these trace years were more favorable than for the two heavy blight years 1915 and 1918.

Furthermore, two non-blight years, 1938 and 1940, had more periods of favorable temperature and rainfall than the severe blight years 1942 and 1943, and more than the trace blight years of 1941, 1946 and 1948. Two other non-blight years, 1923 and 1932, had more periods of favorable rainfall and as many weeks of favorable temperature as the severe years 1915 and 1918. A few of the non-blight years had long periods of favorable temperature but few or no weeks of favorable rainfall. The exceptions cited above indicated that there may not always be a high correlation of blight years to favorable periods of rainfall and temperature.

Discussion

The data presented in the above study indicate that a critical cumulative rainfall line in conjunction with a critical weekly mean temperature would be unreliable for forecasting late blight in Iowa. For instance, the cumulative rainfall line for many trace and non-blight years was above the critical line even though the temperature remained 75°F. or below. Furthermore, the cumulative rainfall lines for about half of the trace and non-blight years was above the critical line.

Cumulative rainfall alone does not adequately express Iowa summer moisture conditions. The Iowa summer rainfall is an extremely variable phenomenon in that most of it occurs as localized nocturnal thunder showers. A few periods of high rainfall may cause a high seasonal cumulative rainfall value not representative of rainfall frequency. As might be expected the rainfall of the individual fields or areas will vary considerably about their regional means.

Other factors such as dew deposition and atmospheric humidity which may be of great importance to the growth and development of Phytophthora infestans should be considered in blight forecasting. The role of dew deposition in inciting epiphytotics of the downy and powdery mildews of cucumber was shown by Duvdevani, et al (3). In 1947, Harrison (4) suggested that long periods of high atmospheric humidity were more important than rainfall in the spread of late blight. Dew deposition is not a linear function of rainfall; therefore, rainfall data alone excludes periods and duration of dew deposition. The influence of dew on the development of an epiphytotic of late blight was demonstrated last summer in a potato plot at Crystal Lake, Iowa.

Within six weeks after the inoculation of four plants with P. infestans a blight epiphytotic destroyed the plants in the plot. During the six-weeks period 4.26 inches of rain fell, or a weekly increment of 0.71 inches. Dew formed on the potato foliage 27 nights of the 42-day period. The dew remained on the leaves as long as 12 hours during many nights. Naturally, this condition was extremely favorable to the development of the pathogen. Hence, periods of dew formation are probably of great importance in late blight forecasting in Iowa.

The evaluation of the rainfall and temperature associated with the non-blight years illustrated the fact that knowledge of the whereabouts of the pathogen is a primary consideration in blight forecasting. The number of non-blight years reported in the State indicate that the pathogen is not omnipresent.

Only limited conclusions can be drawn from the relationship of weather to the trace blight years because the term "trace" blight has not been clearly defined. It may mean that only one or two areas of the State were affected slightly or severely, or that generally there was a trace of infection in the potato producing area. More adequate surveys of the potato area throughout the season will yield useful information on trace amounts of blight.

In forecasting potato late blight there are reasonable doubts about using the weekly mean temperatures based on daily maximum and minimum temperatures. These means do not represent the daily fluctuations in temperature that occur during a given week. The means tend to mask the frequency and duration of low temperature periods which are so vitally important in the development of the pathogen.

Conclusions

An analysis of the rainfall data for six stations in northern Iowa indicated that under Iowa conditions a critical cumulative rainfall line does not differentiate blight from non-blight years.

The meteorological factors such as critical weekly mean cumulative rainfall and critical weekly mean temperature in themselves were not effective in separating the severe from the trace blight years or the blight from the non-blight years in Iowa. Apparently other factors in combination with temperature and rainfall should be considered in formulating accurate blight forecasts.

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DIVISION OF MYCOLOGY AND DISEASE SURVEY, CROP PLANT DISEASE FORECASTING PROJECT, AND IOWA AGRICULTURAL EXPERIMENT STATION, AMES, IOWA

RESULTS OF A FIELD TEST FOR RESISTANCE OF PEA VARIETIES TO THE PEA ENATION VIRUS (PEA VIRUS #1)

Paul G. Smith and Peter R. Dyer

In an effort to see whether any resistance could be found in peas to pea virus #1 (pea enation virus) a planting of the varieties and strains tested below was made at the Hartnell School near Salinas, California, where the disease is often prevalent. A single six-foot row of each lot was made. Germination was variable, however, so the stand averaged approximately 25 plants per seed lot. The plot was planted January 23, 1948 and no control of the aphis population was attempted. Infection was evident by March 5 and by May 13 virtually every plant in the plot had become infected. Symptoms on both pod and foliage were typical of the disease. While the method of testing did not exclude the possibility of other viruses being present, the enation virus was the primary virus causing disease.

The following varieties were included:

Abundance
Alderman, Improved B
Alderman, Late
Alderman, Maryland
Asgrow No. 40
Bayou
Blue Bantam
Bountiful
Canner King
Carter's 8 weeks
Cody
Creole
Dwarf Alderman
Dwarf Market
Dwarf Profusion
Dwarf Telephone
Early Dwarf
Early Harvest
Early Wales
Everbearing
Famous
First & Best
Giant Podded Hamper
Giant Stride
Gilbo
Gradus
Imp. Gradus
Green Admiral
Horsford
Hundredfold
Icer No. 95
Idabelle
Laxtonian
Laxton's Progress
Laxton's Superb
Large Seeded Early
Little Marvel
Major
Mammoth Podded Extra Long
Minn. Early Sweet
Miracle
Morse's Market
Multifold
Navajo
No. 99 Canner
Nott's Excelsior
Oneida
Onward
Pedigree Extra Early
Dark Standard Perfection
Early Perfection
Resistant Perfection
Renard Early Perfection
Premier
Premium Gem
President Wilson
Pride
Prince of Wales
Early Profusion
Profusion
Profusion, Green Seeded
Progress No. 9
Resistant Famous
Rice's No. 13
Shasta
Shoshone
Stratagem
Wisconsin Res. Surprise
Sutton's Excelsior
Thomas Laxton
Topper
Victory
Walah
Wando
Willet's Wonder
Winner
White Marrow Fat
World's Record
Yellow Admiral
Yorkshire Hero

By the end of the season all varieties were classified as susceptible, and only one plant in the whole plot was free of symptoms. Seed of this was saved although this plant was probably an escape. The following varieties seemed less adversely affected by the virus and remained fairly thrifty. Further testing is needed to determine whether a usable level of tolerance is to be found in any of these, however.

Alderman, B	Large Seeded Early	Perfection, Early (strain 4324)
Alderman, Md.	Laxton's Progress	Shasta
Creole	Little Marvel	Thomas Laxton (Res. strain 251)
Early Dwarf	Mammoth Podded Extra Long	Victory
First & Best	Minn. Early Sweet	
Gradus, Imp.		

White and Raphael[1] in observations in field plantings list 12 out of 19 varieties grown which remained healthy. Only three, Giant Stride, Perfection and Surprise were included in both plots, and in all cases probably were quite distinct strains of these varieties.

DIVISION OF TRUCK CROPS, UNIVERSITY OF CALIFORNIA, DAVIS, CALIFORNIA

STORAGE ROTS OF SQUASH IN NEW YORK STATE

A. G. Newhall and R. E. Wilkinson

A number of truck growers, near the larger cities, grow from one to twenty acres of squash which they sell mostly locally. A few ship by truck to more distant markets throughout the fall and winter. During the storage period of from one to six months, losses from various rots may reach 90 percent. The principal varieties are Hubbard, Delicious and Acorn. More growers would turn to Butternut if it were not such a poor keeper.

A survey made December 1 in the Syracuse area revealed the principal causes of loss to be Mycosphaerella citrullina, Rhizopus nigricans, Colletotrichum lagenarium; also species of Botrytis, Cladosporium, Alternaria, and Fusarium. Occasionally a species of Pythium, Sclerotinia,

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[1] White, N. H. and Raphael, T. D. The reaction of Green Pea Varieties to Downy Mildew and Two Viruses. Tasman Jour. Agr. 15:92-93, 1944

or Erwinia seemed to be primary.

Inoculations made in the laboratory on Hubbard fruits, during the winter, after a two or three months curing period indicated that no fungus infection could be achieved without wounding. From the time required for outward symptoms to show after wound inoculation with Mycosphaerella, Colletotrichum, and Fusarium the impression was gained that most of the storage rotting was probably traceable to field infections. In this connection the prevalence of a virus disease, to be described in another publication, is of particular interest since it had a marked effect on the keeping quality of many fruits. At the end of the growing season in one field nearly all of the immature fruits left on the ground seemed to be infected. During storage most virus infected fruits developed numerous checks and open cracks in their surfaces. Pathogenic molds, chiefly Fusaria, then gained entrance to the flesh through these cracks in many places.

The theory that the field is the origin of nearly all storage rot losses was supported by further observations and experiments, the details of which need not be given here. In the first place dipping experiments with a variety of fungicides made as squash were brought from the field have failed on a number of occasions to show any benefits. In the second place spraying of 20 acres of Hubbards four times, by one grower, for the first time in several years appeared to be responsible for reducing his losses to less than 7 percent in 6 months of storage. Other growers who never spray lost up to 90 percent in 3 months. The materials employed included Zerlate and an insoluble copper with rotenone in an alternate schedule as for tomatoes.

Wet weather during the summer is probably of great importance as indicated by one man's experience with two fields of acorn squash. One was planted early and was subjected to excessive rains in June, the fruits of which kept very poorly. The other planted late with the same seed came along through a drier portion of the season and produced fruits which had less than 5 percent rot in December. No spraying except for beetle control was done by him but it is presumed diseases got started early in the first sowing and were held down by drier weather in the late sown field.

The place where squash are stored is of considerable importance, and our observations bear out those of Yeager, Richards et al. that a greenhouse where rapid curing can be induced the first two weeks and where plenty of ventilation and proper temperatures can be maintained at all times is much superior to common storage in a concrete or wooden building where humidities often go too high for too long a time.

In following the progress of rotting through a five-month period in a greenhouse containing 100 tons of Hubbards it was noted that the soft

rots caused by Rhizopus (also noted in September in the field on late blossoms), by Erwinia, and by Pythium sp. were the first to show up in October and November. Those due to Fusaria, following Colletotrichum, Cladosporium, or virus infections came next, and late in the storage period Mycosphaerella constituted 90 percent of the infection with some Botrytis and Fusarium in evidence. None of these seemed to spread much during storage from one fruit to another at air temperatures close to 50°F.

Growers are insect conscious and often make one to three applications of an insecticide, but almost no one employs fungicides yet. With the increased use of Zerlate and the insoluble coppers for tomato disease control a similar program for squash growers may meet with less resistance than formerly and with similarly promising results. It is admitted that spraying after the vines have covered the ground is not very feasible with power equipment but the first three applications may be the most important, and dusting by hand can be done after that. More extensive field spraying and dusting trials are planned for the coming season.

DEPARTMENT OF PLANT PATHOLOGY, CORNELL UNIVERSITY, ITHACA, NEW YORK

OCCURRENCE OF SCLEROTINIA STALK ROT IN CABBAGE SEED PLANTS IN SKAGIT COUNTY, WASHINGTON IN 1948

D. M. McLean

A serious stalk rot of cabbage seed plants, caused by Sclerotinia sclerotiorum D By., is present in a greater or less degree every year in commercial cabbage seed fields in Skagit County, Washington. Due to favorable conditions for sporulation and infection, the disease was unusually severe in 1948. Nearly 100 percent infection resulted in experimental plantings. Because of the seriousness of the disease and unfavorable harvest weather seed yields will probably average less than 400 pounds per acre as compared to an average of well over 1000 pounds in 1947.

Infections are caused by wind-blown ascospores liberated from apothecia which develop from soil-borne sclerotia. Although the disease is recognized as a stalk rot and is commonly called "white blight", primary infections occur on the leaves or at the base of petioles. The fungus invades the stalks from the primary foliar infections. Observations during two seasons seem to correlate leaf infections with petal fall following pollination. Infections occur beneath the fallen petals. Precipitation during the blossom period causes the falling petals to stick to the foliage and to determine the relative severity of the disease each season. Cabbage varieties highly susceptible to Mycosphaerella

brassicicola (Fr.) Lindau. are often defoliated early in the spring and these varieties are less affected by Sclerotinia. Due to the wide range of susceptible herbaceous plants and the concentrated culture of seed plants in the Skagit Valley, the causal fungus is common to many soils. Crop rotation has given little control. It is during the threshing operation that sclerotia from infected plants are scattered on the soil. In the milling of turnip and cabbage seed sclerotia are collected in the screenings in great amounts. Many sclerotia are of such size that they are difficult to separate from the seed in the ordinary milling operation. This has been particularly true this season.

Experimental dusting and spraying during two seasons has failed to give significant control of Sclerotinia. The following materials have been used in combination with benzene hexachloride as an insecticide in a 5-application schedule: Sprays--Dithane D-14, Fermate, Zinc coposil, Copper A compound, Phygon, and Polyethylene polysulfide. Dusts---Sulfur, Dithane Z-78, Copper A compound, Zerlate, Fermate, Zinc coposil, Copper hydro, Yellow cuprocide with sulfur, Fermate with sulfur, and Zinc coposil with sulfur. Sprays were applied at 250 pounds pressure with a three-nozzle broom. Dusts were applied from a tractor mounted power duster using a single outlet orchard type duster nozzle.

Dusting or spraying cabbage seed plants is a relatively new adventure to the growers. While dusting for insects is recommended, most is done by airplane. No provision is made in planting for the accommodation of ground equipment. The plants are ordinarily set 18 inches apart in rows approximately 5 to 6 feet apart. The seed plants are staked at intervals in the rows and binder twine tied between the stakes offers support. Plants are usually 5 to 6 feet in height at flowering time. Under these conditions it is difficult to obtain adequate coverage of fungicidal materials.

COOPERATIVE INVESTIGATIONS OF THE DIVISION OF FRUIT AND VEGETABLE CROPS AND DISEASES, U. S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING; AND THE NORTHWESTERN WASHINGTON AGRICULTURAL EXPERIMENT STATION

EXPERIMENTAL FORECAST OF WHEAT LEAF RUST IN OKLAHOMA FOR 1949

K. Starr Chester and Dallas F. Wadsworth

This is the ninth annual forecast of wheat leaf rust in Oklahoma. The results of the first seven forecasts are summarized, with literature citations, in the Plant Disease Reporter (32: 176-181, 1948), where it is shown that each of these seven forecasts, whether for abnormally light, moderate, or severe leaf rust damage, was amply justified by harvest time, not only for Oklahoma, but usually for much or all of the wheat area

to the north. The cited references also discuss the scientific basis for the forecasts.

The eighth forecast, for 1948, issued as usual on April 1, long before harvest time, considered the prospects for a relatively rust-free wheat crop in Oklahoma the best in ten years, with rust "too little and too late" to seriously damage the Oklahoma crop. The result was exactly as forecast.

At Stillwater, in Central Oklahoma, the level of rust as the wheat crop approached maturity was the lowest in the senior author's experience, so low, in fact, that variety reaction readings had to be delayed until just before the normal death of the leaf tissue, and even then, many plots could not be read because rust was absent or the amount of rust was too slight to bring out significant differences between varieties.

Reports from many States confirmed the emphatic statement in "Farm Journal" (Nov., 1948, p. 50) that the forecast was fully borne out, not only in Oklahoma, but generally throughout the hard wheat belt. The "Cargill Crop Bulletin" (Aug. 5, 1948, p.3) stated that the 1948 U. S. wheat crop was "remarkably free from this hazard." H. R. Rosen in Arkansas wrote on August 5 that "leaf rust showed up much later than usual and the damage from it was almost nil." D. G. Fletcher, reporting for Minnesota and the Dakotas July 21, 1948, stated that "leaf rust..... came too late to do material damage." The interested reader will find numerous other statements to the same effect in the 1948 rust summaries of the U. S. Department of Agriculture Bureau of Entomology and Plant Quarantine, which, unfortunately, cannot be quoted here because they are "not for publication."

Considering the well known yield-depressing effects of even "normal" wheat leaf rust, it is quite possible that the least rust in a decade or more played a significant part in United States production, in 1948, of the second largest wheat crop in history, as intimated by "Farm Journal". As usual in a low-rust year, official preharvest estimates of the wheat crop were grossly low. The official May 1 yield expectation of agricultural economists for Oklahoma was for 75 million bushels, but actual harvest, a month later, was 98 million bushels. The reverse of this occurs in years of severe rust, as in 1938, when Oklahoma preharvest expectations ran as high as 77 million bushels, though only 57 million were harvested.

In February, 1949, no rust could be found at examination points near Stillwater. On March 3, rust appeared at the low level of 2 pustules on 2962 leaves, and this increased through March to 74 pustules on 1380 leaves March 23, and up to 2 to 3 percent rust, according to the modified Cobb scale, on March 28.

On March 26 to 28, a 770-mile survey trip was made through the principal Oklahoma wheat areas, with fields sampled every 10 to 15 miles. The maximum amounts of leaf rust observed, in terms of the modified Cobb scale, were, for the counties indicated: Payne, 0-2 percent; Noble, 0-5 percent; Kay, 0-5 percent; Grant, 0-0 percent; Alfalfa, 0-5 percent; Woods, 0-4 percent; Harper, 0-0 percent; Woodward, 0-0 percent; Major, 0-0 percent; Dewey, 0-4 percent; Custer, 1+ percent; Washita, 0-1 percent; Beckham, 2 percent; Greer, 4-5 percent[1]; Jackson, 2-10 percent; Kiowa, 10-12 percent; Tillman, 5-12 percent; Comanche, 2+ percent; Stephens[2], 2-4 percent; Grady, 0-2 percent; Canadian, 1-3+ percent; Kingfisher, 1-2 percent; Garfield, 1-4 percent.

The rust evidently survived the winter in Oklahoma in minimal amounts. This was associated with a winter of normal, average temperatures (+2° to -2° from average) with excessive moisture (150-200 percent of average), but with retardation of the wheat in development, much snow, and hard freezes.

The 1949 season promises to be one of no more than normal or average rust development, comparable to 1947. The April 1 level of rust is considerably higher than in 1948, but much below the amount which results in severe rust damage, as in 1945 or 1938. Some damage may be expected in late-maturing fields, and in low, wet locations, but the bulk of the crop is expected to rust late and suffer no more than the 3 to 5 percent damage which represents the average toll of leaf rust in the Southwest.

This will probably be the last time that the senior author, now permanently located in Ohio, will be able to participate in the annual Oklahoma rust forecasting. Indeed, the present forecast was made at long range, by analysis of data gathered entirely by the junior author. After eight seasons of early April forecasts, each of which has been fully substantiated by harvest time, it is believed that the soundness of the procedure has been amply justified. The forecasts have included seasons of severe rust epiphytotics, others of relative freedom from rust, and still others of intermediate character, and they have had reliability for areas far to the north of Oklahoma. Numerous communications from farmers, grain merchants, and others have testified to the usefulness of the forecasts.

Reliable forecasts of plant diseases can be of much value in decreasing losses and increasing the efficiency of agricultural production. Already success has been obtained in the accurate forecasting of outbreaks or losses from wood decay, downy mildews of cucurbits, tobacco, and grape, potato and tomato late blight, corn wilt, cranberry fruit rots, apple

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[1] 4 to 5 percent on volunteer wheat; 2 to 3 percent on fall-planted wheat.

[2] Northern part of Stephens County.

scab, sugar beet curly top, black root rot, and yellows, alfalfa wilt, and Texas root rot of cotton. An extended discussion of these cases and of disease forecasting in general will be found in the forthcoming book, "Plant Disease Losses: Their Appraisal and Interpretation", from which the following two paragraphs are quoted:

"Science is concerned with the discovery of causation of natural events, and when the principles of causation are sufficiently well known, science reaches its goal of permitting the accurate prediction of events on the basis of known antecedent circumstances. The study of disease appraisal is no exception. Any instance of the estimation of disease intensity and conclusion, based on experiment, that this disease intensity will result in a given degree of loss, is a prediction from cause to effect, a legitimate application of the scientific method. In plant disease appraisal, this usage reaches its highest development when a knowledge of disease intensity-loss relationships is combined with an understanding of the progressive changes in disease intensity itself, permitting one to predict accurately that the pathological situation of the moment will be followed by certain developments in disease intensity, and that these, in turn, will result in a given degree of loss."

"....the prediction of plant disease outbreaks and losses is not guesswork. It is a useful application of the study of plant disease appraisal and epiphytology, with a record of reliability that compares very favorably with the admittedly justifiable forecasting of weather, crop yields, and other natural occurrences. It is equally clear that plant scientists have made only a bare beginning in developing this phase of their research, and that a great field of service to agriculture lies before us, awaiting cultivation."

BATTELLE MEMORIAL INSTITUTE, COLUMBUS, OHIO AND OKLAHOMA AGRICULTURAL EXPERIMENT STATION

NOTE ON A SCOPULARIA ATTACKING WESTERN WHITE PINE

Lake S. Gill and Stuart R. Andrews

While engaged in investigations of "pole blight", a disease of unknown cause, attacking western white pine (Pinus monticola Dougl.) in Idaho, Montana, and Washington, the writers had occasion to make several hundred isolations in an attempt to determine what fungi, if any, are involved.[1]

Among the fungi isolated are several members of the genus Scopularia Preuss emend. Goid. (Leptographium Lagerb. & Melin). One of them resembles S. serpens Goid. more strongly than it does any species previously reported on western white pine from this region and is particularly noteworthy because preliminary tests indicate it may be parasitic on bark as well as wood.

The fungus was isolated from stems and roots of diseased as well as apparently healthy trees at several widely scattered points throughout the range of Pinus monticola. Several isolates were used for inoculations in short pieces of pine stems on which they produced definite bark lesions in five to eight days and often caused blue stain in the underlying wood within three weeks.

Further work designed to test the role S. serpens (?) may play in the pole blight complex is planned for the coming year.

DIVISION OF FOREST PATHOLOGY, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, U. S. DEPARTMENT OF AGRICULTURE

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[1] Laboratory and field facilities for this work were furnished by the U. S. Forest Service, U. S. Department of Agriculture.

PROMISING TREATMENTS FOR CONTROLLING ROOT DISEASE AND WEEDS IN A SOUTHERN PINE NURSERY

Ralph M. Lindgren and Berch W. Henry[1]

Exploratory soil disinfection trials against a perplexing root disease in southern pine nursery beds revealed two treatments that greatly reduced the root trouble and one that gave striking control of weeds. Although preliminary, the main results may be of interest to those concerned with disease control and general cultural practices at forest tree nurseries. The work was done at the W. W. Ashe Nursery near Brooklyn, Mississippi, in cooperation with Region 8 and the Southern Forest Experiment Station of the U. S. Forest Service. P. V. Siggers of the Division of Forest Pathology assisted in establishing the plots and recording final results.

The condition known as "root rot" at the nursery involves symptoms that could easily result from more than one cause. When one-year-old stock is lifted, some seedlings may show only a reddening and roughening of the cortex in localized areas on the tap and larger lateral roots. Other seedlings may have lateral and the lower part of tap roots either blackened or entirely rotted away. A proliferation of secondary roots above the rotted part of tap roots is not uncommon. Severe damage to the roots may occur without noticeable above-ground symptoms. Poor survival of infected seedlings in field plantings, rather than high mortality in nursery beds, usually has been of greatest concern.

Sixteen soil treatments and an untreated control were compared in 4 x 5-foot plots in standard nursery beds. These treatments were randomized in each of three blocks for each of two tree species, longleaf pine (Pinus palustris Mill.) and slash pine (P. caribaea Morel.). All fungicidal materials were well distributed to at least a 6 inch depth in the soil. To accomplish this, the top 4 inches of soil was removed and one-half of the total chemical for each plot was worked or watered into the soil at the lower bed level. The soil removed was then replaced and the remaining one-half of the chemical was distributed through the top 4 inches of soil. Before applying, dry chemicals were mixed with about 100 times their volume of dry sand. After spreading and working in, a water drench of one pint per square foot at the lower bed level and one quart per square foot on the completed plot surface was applied. Liquid materials were diluted with enough water for an application of one pint and one quart of solution per square foot to the lower and completed bed

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[1] Senior Pathologist and Pathologist, Division of Forest Pathology, Bureau of Plant Industry, Soils and Agricultural Engineering, U. S. Department of Agriculture, in cooperation with Southern Forest Experiment Station, New Orleans, La.

Table 1. Weighted mean numbers of seedlings per square foot and percents of seedlings with rotted and healthy roots in three replicated series of longleaf and slash pine plots treated with various soil disinfectants.

Treatment & Amount Per Acre		Seedling Stand				Proportion of Seedlings Infected and Healthy					
		Longleaf pine		Slash pine		Longleaf pine			Slash pine		
Material	Approximate Amount	Per sq.ft	Plantable[a]	Per sq.ft	Plantable[a]	Severe rot	Light rot	Healthy	Severe rot	Light rot	Healthy
	Lbs.	no.	%	no.	%	%	%	%	%	%	%
Allyl alcohol(IscoAA)	360	11.9	95.0	47.1	80.0	43.5	35.3	21.2	21.6	47.0	31.4
Chloropicrin (Larvacide)	575	9.9	96.0	33.5	83.3	1.3	17.1	81.6	1.1	33.3	65.6
DD-dichloropropanes & propenes (Dowfume N)	500	4.7	91.5	33.1	77.9	54.6	40.9	4.5	23.5	41.3	35.2
Ethylene dibromide (Dowfume W-40)	360	5.5	94.5	33.3	78.4	0	4.7	95.3	2.3	31.6	66.1
Ethyl mercury iodide (5% in talc)	150	8.6	88.4	37.5	81.9	52.9	42.2	4.9	16.6	51.3	32.1
Ferrous sulphate	4000	8.3	81.9	42.3	73.3	66.4	24.5	9.1	31.4	47.6	21.0
Formaldehyde (40%)	2700	10.2	92.2	33.9	86.4	48.3	40.4	11.3	8.0	36.5	55.5
Sodium ethylene bisdithiocarbamate (Dithane D-14)	150	5.4	85.2	37.4	79.4	80.4	18.6	1.0	22.1	51.3	26.6
Zinc trichlorophenate	150	6.8	95.6	35.2	81.8	44.7	49.4	5.9	23.4	50.7	25.9
Untreated control		6.4	90.6	36.9	77.8	81.3	18.7	0	28.8	43.8	27.4

[a] Seedlings were classed as plantable on the basis of size and not on the presence or absence of root disease.

surfaces, respectively. The three fumigants, chloropicrin, DD, and ethylene dibromide, were applied to holes about 6 inches deep and staggered 10 inches apart. The treated holes were packed with soil immediately and a water seal of one quart per square foot was given to the plot surface.

Beds were sown on March 18, 1947, which was at least two weeks after the application of any of the treatments. The stand of longleaf pine seedlings was abnormally low, due to a combination of poor seed and severe rain washing. Seedlings were lifted on January 15 and 16, 1948, and field plantings of test material were made by U. S. Forest Service personnel shortly thereafter. Full data on field survival are not yet available.

Rates of application of the chemicals, seedlings per square foot and amount and type of root rot for nine treatments are shown in Table 1. The seven other treatments were: salicylic acid at 240 lbs. per acre; ferric dimethyldithiocarbamate (Fermate), tetrachloro-para-benzoquinone (Spergon, wettable), tetramethyl thiuramdisulphide (Arasan), and zinc ethylene bisdithiocarbamate (Dithane Z-78) - each at 150 lbs. per acre; formaldehyde at 2700 lbs. plus fertilizer at three equal rates on June 10, August 13, and October 6, with a total application of 80 lbs. N, 400 lbs. P_2O_5 and 240 lbs. K_2O per acre; ethyl mercury iodide (5%) at 150 lbs. plus fertilizer as described previously. The results obtained with these materials in root disease control were no better than those for the least promising treatments listed in Table 1.

Control of root disease - Two fumigants, chloropicrin and ethylene dibromide, were outstanding in control of the troublesome root disease. Plots treated with these materials showed practically no severe rot and very little of the light type. In contrast, over 80 percent of the untreated longleaf pine seedlings were severely rotted and none were healthy. Formaldehyde and allyl alcohol appeared to rank next in effectiveness but were significantly inferior to the two fumigants. The various fungicidal treatments and the fumigant DD were largely or entirely ineffective.

Control by two fumigants and the failure of a number of strongly fungicidal materials point to nematodes as a contributing factor in the root disease problem. Partial control by formaldehyde, which reportedly has some nematocidal value, and by allyl alcohol, which could easily function similarly under the deep application methods used, strengthens the evidence. Research aimed at determining the causal complex is in progress.

Control of weeds - Striking control of weeds was obtained until middle June in all plots treated with allyl alcohol. Two early weedings were eliminated and subsequent work in keeping the plots clean was

greatly reduced. Of the remaining treatments, only zinc trichlorphenate showed a clear-cut reduction in weeds, but its effect was markedly inferior to that of allyl alcohol.

The weed control properties of allyl alcohol are distinctly promising for forest nursery use, provided this toxic chemical can be handled safely and yearly applications result in no deleterious effect on soil, mycorrhizae, etc. A presowing treatment with this material might at least be helpful in supplementing the use of petroleum oil sprays that are somewhat hazardous to pine during early stages of growth.

Stand of Seedlings - Plots treated with allyl alcohol produced the largest number of seedlings, both total and plantable, of the two tree species. For slash pine, this number represented almost 22 percent more plantable seedlings per square foot than were obtained from any other treated plots and over 30 percent more than from the untreated plots. Observations indicated that allyl alcohol had reduced early damping-off losses. Seedling stands were not increased significantly by the two fumigants that were most effective in root disease control. However, an evaluation of results with these and all other promising treatments must await further trials on rates and methods of application and data on survival of seedlings in field plantings.

DIVISION OF FOREST PATHOLOGY, U. S. BUREAU OF PLANT INDUSTRY, SOILS AND AGRICULTURAL ENGINEERING, IN COOPERATION WITH SOUTHERN FOREST EXPERIMENT STATION, NEW ORLEANS, LA.

ASH ANTHRACNOSE APPEARS IN CALIFORNIA

Donald M. Coe and Willis W. Wagener

During the late spring and early summer of 1948 there occurred in the Central Valley region of California a noteworthy outbreak of ash anthracnose caused by the fungus, Gloeosporium aridum Ell. & Holw.

The disease was first brought to our attention at Sacramento on April 16, 1948. At that time it was well advanced in development in street, park and home plantings of ash in the Sacramento area. Both the normal form of Arizona ash (Fraxinus velutina Torr.) and the Modesto variety, which has been widely used in street plantings in Central California because of its better appearance and relative freedom from attack by insects (myrids and tingids) as compared with the ordinary form of the species, were affected. The disease was more pronounced in the lower portions of the crowns of attacked trees than in the upper portions, resulting in a leaf loss in excess of 50 percent in the lower half of the crowns of some trees. Numerous small, elliptical cankers had formed at the base of the current season's growth, causing the partial or complete girdling of young shoots.

Additional specimens of diseased material were received from April 16 to June 10 from Lodi, Modesto, Fairfield, Marysville, and the Sacramento area. On May 4, a brief survey in and around Modesto showed considerable infection in the trees of that area and heavy infection on the original Modesto ash, located in West Side Park of that city. The disease had been noted on this tree by Park employees during 1947, also.

A delayed spring, marked by prolonged rains and cool temperatures, no doubt provided very favorable conditions for the development and spread of this disease in 1948. So far as known, it had not been noted in California prior to 1947. Up to that time, injury to ash in the State had been chiefly from insects and mites, with occasional foliage injury to native trees of Fraxinus oregona Nutt. by the fungus, Cylindrosporium fraxini (Ell. & Kell.) Ell. & Ev. The abundance and distribution of ash anthracnose in 1948 in the Central Valley region of the State indicates that it is sufficiently well established to recur with severity whenever spring weather conditions favor the development of the disease.

BUREAU OF PLANT PATHOLOGY, CALIFORNIA DEPARTMENT OF AGRICULTURE, SACRAMENTO AND DIVISION OF FOREST PATHOLOGY, U. S. BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

NEW OR UNUSUAL RECORDS OF PLANT DISEASES

OCCURRENCE OF CABBAGE YELLOWS IN LOUISIANA

by M. Ishaque

During October 1948, cabbage plants in a farmer's field in Breaux Bridge, Louisiana, showed disease symptoms such as yellowing, wilting and finally death of the plants, which accounted for a 10 percent loss of plants in the field. An examination of a diseased plant sent in by the county agent, Mr. C. C. Gauthier, disclosed blackened areas in the vascular tissues of the roots, hypocotyl and stem. A microscopic examination revealed the presence of fungus hyphae in the tissues.

The disease organism was isolated and identified as Fusarium conglutinans Wr. (F. oxysporum f. conglutinans Snyder & Hansen). The fungus produced microconidia and chlamydospores on potato dextrose agar, oat meal agar, and sterilized oats, but very few macroconidia were produced on these media. Macroconidia were produced in greater number on sterilized cabbage leaves.

In a pathogenicity test, the disease was produced under controlled conditions by the exclusive use of the fungus. The first symptoms appeared in about 12 to 14 days after three-weeks-old cabbage seedlings were transplanted to sterilized soil to which the Fusarium conglutinans had been added. Small areas of stems, seed leaves and the first foliage leaves turned yellow. Within the next 2 to 3 days, these necrotic areas increased rapidly in extent and finally these plants wilted and died. From the infected plants, the fungus was re-isolated. The control plants did not develop any such symptoms and fungus could not be isolated from them.

The occurrence of this disease in Louisiana has not been previously reported. No explanation as to when and how the fungus was introduced can be given at present.

DEPARTMENT OF BOTANY, BACTERIOLOGY, AND PLANT PATHOLOGY, LOUISIANA STATE UNIVERSITY, BATON ROUGE, LOUISIANA

SOME UNUSUAL LETTUCE DISEASES IN CONNECTICUT

by Saul Rich

During the 1948 season, symptoms of big-vein appeared in commercial lettuce fields near New Haven. The symptoms followed the typical course of the disease, being most severe in the spring and disappearing during

the warm summer months. The big-vein virus was successfully transmitted by transplanting lettuce seedlings to soil taken from diseased fields. Another group of lettuce seedlings remained healthy when grown in an autoclaved portion of the same soil.

In March of this year, downy mildew (Bremia lactucae Reg.) severely attacked lettuce seedlings in cold frames. The disease was first observed in the area around New Haven. This outbreak is the first of its kind in Connecticut in approximately 25 years. The attack was brought on by a period of cold, wet weather occurring when the plants were three to four inches high.

CONNECTICUT AGRICULTURAL EXPERIMENT STATION, NEW HAVEN, CONNECTICUT

DOWNY MILDEW OF SNAPDRAGON IN NEW YORK

by C. E. Williamson

Snapdragon plants infected with downy mildew, caused by Peronospora antirrhini Schroet., were brought to a florists meeting at Albany, N. Y. on February 10, 1949. The disease was stated as affecting two to three percent of plants coming into bloom in a greenhouse near Troy, N. Y. The disease does not appear to have been reported previously from New York.

CORNELL UNIVERSITY

UNUSUAL INCIDENCE OF EXOBASIDIUM AZALEAE IN TEXAS

by E. C. Tullis

I have had several reports lately of Exobasidium azaleae and it seems that there is a good deal more of it this year than usual. It seems to have followed up two dry summers with extreme cold during the winter. Whether these climatic conditions have had anything to do with the build up of this disease, I do not know. It is also true that we have had extra-heavy rainfall during the spring seasons when these plants are putting on new growth and this may have had something to do with the increased incidence of this disease.

U. S. DEPARTMENT OF AGRICULTURE, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, BEAUMONT, TEXAS

CORRECTIONS FOR SUPPLEMENT 181

I. Dr. J. W. Heuberger sends the following corrections to be made in Supplement 181:

1. On page 56 under TENNESSEE under BUCKEYE ROT. The first part of the fifth line now reads "...were no better than the Untreated". Please take the period out after Untreated and add the following: "...except for COCS dust which reduced Buckeye Rot to 13.4% when the Untreated had 19.6%, and which reduced the percentage of total fruit rots to 19.6% when the Untreated had 29.8%. However, COCS dust was applied at a much higher rate (93 pounds of metallic copper being applied per acre) than the other dusts."

2. The following corrections should be made in the list of chemicals according to Dr. S. E. A. McCallan:

> "There is no compound 163 containing a mixture of glyoxalidines, manufactured by Carbide & Carbon, possibly 169, a chromate is what is meant. Compound 531 is a chromate, not a mixture of glyoxalidines. 'Goodrite ZAC, zinc methyl dithiocarbomate Du Pont' is listed. The chemistry and manufacturer are wrong. Listed under ZAC the chemistry is right but manufacturer omitted. This a Goodrich product. Standen 307 is or was also a Goodrich product."

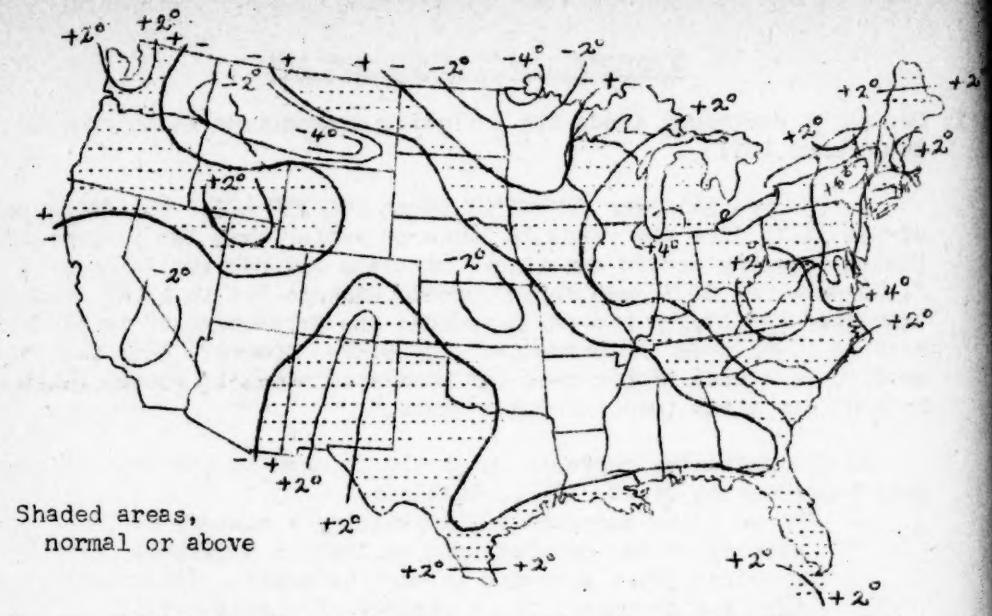
3. In the summary of the vegetable work, make the following changes:

(a) On page 63 under No. 2, insert "in a few tests" between phytotoxic and when so that the first line in No. 2 will read as follows: "The fact that Parzate was phytotoxic in a few tests when.....".
(b) On page 63 for CHROMATE 658 change the last sentence to read as follows: "It was injurious to tomatoes and slightly so to potatoes".

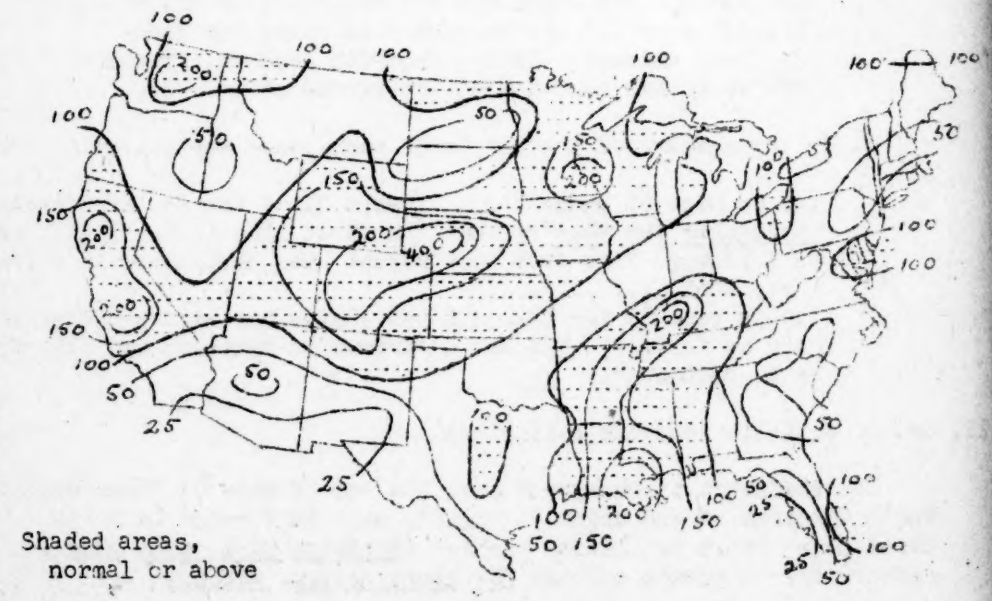
II. Dr. D. E. Ellis adds the following:

The statement in paragraph 1 at the top of page 63 "Anthracnose - North Carolina -" and under "Spergon", page 64 " - and in North Carolina -" apply to Chinese cabbage (Brassica pekinensis Rupr.) rather than to common cabbage (B. oleracea var. capitata L.)

On page 77, paragraph 3 under "Green beans, root-knot, North Carolina -": The materials used were DD, Iscobrome D (instead of Dowfume W-40) and chloropicrin, and each was applied at rates of 200, 400, and 600 pounds per acre (approximately equivalent to 20, 40 and 60 gallons per acre of DD, 27, 54 and 81 g. p. a. of Iscobrome D, and 15, 30 and 45 g. p. a. of chloropicrin).



Map I. Departure of mean temperature from normal for March, 1949



Map II. Percentage of normal precipitation for March, 1949

MARCH WEATHER

(From U. S. Department of Commerce, Weather Bureau, Weekly Weather and Crop Bulletin for the week ending April 5, 1949)